

From the:
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

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PCT

WRITTEN OPINION

(PCT Rule 66)

To:

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Date of mailing
(day/month/year)

22.03.2004

Applicant's or agent's file reference

G1162

REPLY DUE

within 0 month(s) and 15 days
from the above date of mailing

International application No.

PCT/US02/32605

International filing date (day/month/year)

11/10/2002

Priority date (day/month/year)

26/11/2001

International Patent Classification (IPC) or both national classification and IPC

H01L21/768

Applicant

ADVANCED MICRO DEVICES, INC.

1. This written opinion is the first drawn up by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain document cited
- VII ☐ Certain defects in the international application
- VIII ☐ Certain observations on the international application

3. The applicant is hereby invited to reply to this opinion.

When? See the time limit indicated above. The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also: For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 bis.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 26/03/2004.

Name and mailing address of the international preliminary examining authority:



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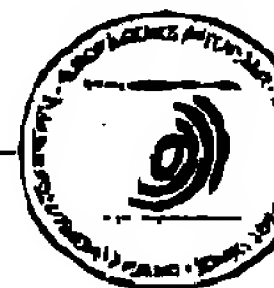
Authorized officer / Examiner

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Formalities officer (incl. extension of time limits)

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I. Basis of the opinion

1. With regard to the elements of the international application (Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed",

Description, pages:

1-7 as originally filed

Claims, No.:

1-10 as originally filed

Drawings, sheets:

1/9-9/9 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

WRITTEN OPINION

International application No. PCT/US02/32605

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability, citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims 1, 2
Inventive step (IS)	Claims 3-10
Industrial applicability (IA)	Claims

2. Citations and explanations
see separate sheet

**WRITTEN OPINION
SEPARATE SHEET**

International application No. PCT/US02/32605

The examination is being carried out on the following application documents:

Description, pages:

1-7 as originally filed

Claims, No.:

1-10 as originally filed

Drawings, sheets:

1/9-9/9 as originally filed

Reference is made to the following documents:

D1: US 2001/035237 A1 (NAGANO SHOZO ET AL) 1 November 2001 (2001-11-01)

D2: EP-A-1 039 531 (TOKYO SHIBAURA ELECTRIC CO) 27 September 2000 (2000-09-27)

D3: US-A-6 090 710 (DELIGIANNI HARIKLIA ET AL) 18 July 2000 (2000-07-18)

D4: EP-A-0 567 867 (IBM) 3 November 1993 (1993-11-03)

D5: EP-A-1 094 515 (LUCENT TECHNOLOGIES INC) 25 April 2001 (2001-04-25)

1. The present application does not comply with **Article 33(2) PCT** because claims 1 and 2 lack novelty:

D1 discloses (see figure 3 and §[0031]):

A method for fabricating an integrated circuit, the method comprising (fig. 3): forming a barrier layer (col. 3, § [0031]) along lateral side walls and a bottom of a via aperture (18), the via aperture being configured to receive a via material that electrically connects a first conductive layer (14) and a second conductive layer (26); and providing a ternary copper alloy via material in the via aperture to form a via (see especially col. 3 §[0031]).

Although not explicitly cited, the "ternary alloy" is implicitly included by the expression of "copper alloy with one or more other elements" used all along D1.

The subject-matter of claims 1 and 2 is therefore not new (**Article 33(2)PCT**).

The subject matter of claims 1 and 2 is also not new over D2 (see claims 1 and 4, and

figure 1F), D3 (figure 1, col. 8 lines 46-50)."

D4 discloses the use of the ternary alloy CuSiCr as interconnection metal (see abstract). If not rendered implicit by the word "interconnection" (**Article 33(2) PCT**), the details relating to the formation of the interconnection (via hole, two conductive layers to be connected, barrier layer ...) mentioned in claims 1 and 2 and not explicitly mentioned in D4 are obvious (**Article 33(3) PCT**).

2. Following remarks should be made about dependent claims 3-10 regarding novelty (**Article 33(2) PCT**), inventive step (**Article 33(3) PCT**) and clarity (**Article 6 PCT**):

- Claims 3, 6 and 9 are drafted as a result to be achieved (lowering the resistance of the interconnection, increasing grain size and obtaining a grain size within a specified range respectively), and therefore do not comply with **Article 6 PCT**.
- Claims 4 and 7 refer to known alloying elements, commonly added to copper for improving the interconnection properties (see for instance abstracts of D1, D3 and D5), and are therefore either not new (**Article 33(2) PCT**) (as far as In and Sb are concerned) or do not as such involve an inventive step (**Article 33(3) PCT**) (as far as Ag, Ca and Cr are concerned).
- Claims 5 and 8 refer to quantities of added elements commonly used in the art (see for instance abstract of D1), and do not therefore involve an inventive step as such.
- Ternary alloys cited in claim 10 are not mentioned in any embodiment and therefore would appear to lack support in the description (**Article 6 PCT**).

3. Specific ternary alloys clearly supported by the description (mentioned in the embodiments) are not disclosed in the cited prior art. A new set of claims limited to said materials would therefore appear to comply with **Article 33(2), 33(3) and 6 PCT**.

4. In order to facilitate the examination of the conformity of the amended application with the requirements of **Article 34(2)(b) PCT**, the applicant is requested to clearly identify the amendments carried out, no matter whether they concern amendments by addition, replacement or deletion, and to indicate the passages of the application as filed on which these amendments are based (see also **Rule 65.8(a) PCT**).

If the applicant regards it as appropriate these indications could be submitted in handwritten form on a copy of the relevant parts of the application as filed.